

BYTE-BACK CO. M-64 MEMORY MANUAL

This module contains RAM chip MK4564 instead of MCM6665 as stated in the manual. The parts are interchangeable.

Your new BYTE-BACK M-64 memory module employs the latest technology in memory design. It uses the newest 64K I.C.'s available (Motorola MCM6665). The M-64 design provides the expansion port on the back that allows you to expand the use of your ZX81 and connect a printer or other module at the same time you are using your M-64.

The M-64 wired and tested unit comes to you fully tested. Our extensive memory tests ensure that every single memory location is operating correctly.

BASIC OPERATION

NEVER CONNECT OR DISCONNECT YOUR M-64 TO YOUR ZX81 WHEN POWER IS APPLIED.

Remember, keeping the video cable and power cable away from each other will give you a better display.

With power disconnected, plug the M-64 into the ZX81. Make sure it is plugged in all the way. Connect the power and watch the screen. You can tell your M-64 is working if it takes four or five seconds for the cursor to appear. Without the M-64, the cursor will appear almost immediately. This delay with the M-64 is a feature of the ROM. There is a program in the ROM to do a brief test of the system memory when power is first turned on. It doesn't take long to test 1K of memory, but with more memory it takes longer.

The ROM only checks the first 16K of memory and in fact, the computer doesn't even know that more memory is available until you tell it. The upper limit of memory is called RAMTOP. To change it to 64K enter the following:

POKE 16389, 255 This changes RAMTOP which tells the ZX81 how much memory is available.

NEW This initializes the ZX81 for the new limit.

(Refer to chapter 26 of the ZX81 Handbook if you want to set RAMTOP lower.)

Now the ZX81 automatically puts instructions in the 16K to 32K area and puts arrays and variables in the 32K to 64K area. The arrays and variables start at the top and move down and will automatically go into the lower 16K when the top 32K is full. The instructions automatically go into the lower part of the 16K to 32K area and move towards the 32K point in the memory as more instructions are added. Remember, you can only have 16K of BASIC program steps.

The M-64 contains a full 64K of RAM. The ZX81 can only address 64K locations, and the first 8K are dedicated to its own ROM. Therefore the M-64 only adds 56K of useable memory to the ZX81. The 1K of RAM in the ZX81 is automatically disabled when the M-64 is connected. There is a small amount of memory at 16K and at 64K that is used by the Sinclair ZX81 for its display file and system variables.

Since the ROM takes the memory addresses from 0 to 8K and RAM starts at 16K, there is 8K between 8K and 16K that is normally not used, but with your M-64 we have made it available to you. You can reach it directly in your BASIC program using PEEK and POKE. This area can be used to store data or machine language programs. The contents of this area is not lost when you load a tape. This area can also be used for memory map Input/Output. You can put your PROMS, etc. here. You can change this 8K area from RAM to memory mapped I/O in 2K increments by making a cut at points "a" thru "d". Cutting strap "a" takes the 14K to 16K area out of RAM, "b" 12K to 14K, "c" 10K to 12K and "d" 8K to 12K.

RUN PROGRAMS WRITTEN FOR 16K

With the BYTE-BACK M-64 you can run any of your 16K programs in the normal way with no changes.

To make full use of your additional memory be sure to use a multi-dimensional string array instead of a simple string, since the ZX81 limits single string sizes to a maximum length of 16K.

IMPORTANT: Read through the instructions before you start assembly.

If anything seems unclear or difficult, contact us for advice before going ahead.

1. PREPARATION

You will need a clean, dry and well lit workspace in which to assemble your kit. If possible, try to find somewhere where the parts can stay undisturbed in case you don't finish the kit all at once. You will need the following tools:

- (a) A small electric soldering iron with a 15 to 25 watt heating element.
- (b) Fine gauge solder with rosin flux. NOT acid flux.
- (c) A pair of sharp diagonal cutters.
- (d) A medium size ordinary screwdriver.
- (e) A pair of needle nose pliers.

The following items are optional, but useful:

- (a) A muffin pan from the kitchen makes an ideal organizer to allow you to sort and store all of the parts while you are building the kit.
- (b) A magnifying glass for examining solder joints and looking for solder shorts.
- (c) Some desoldering braid or other solder removing tool. Better still, take care that you put the components in right the first time. Removing them can be very difficult.
- (d) A piece of foam is useful to stop components from falling out when you turn the board over to solder it.

2. PRECAUTIONS

There are several integrated circuits (I.C.'s) in the kit. Most of them are susceptible to damage from static electricity. There's no cause for worry if a few precautions are taken:

- (a) Keep the I.C.'s in their protective packing until you are ready to use them.
- (b) A soldering iron with a properly grounded tip is desirable.
- (c) Carpets and clothing of man-made fibers, and synthetic soles on shoes, are prone to building up a static charge. Ground yourself by touching a large metal object if possible. It is better to work in a room without carpet.

3. COMPONENT IDENTIFICATION

Before you start assembly, check the components against the Bill of Materials and make sure you know what each part is. We have tried to cover all of the different markings of the components, but variations are possible.

All of the components have to go in one particular way, except the resistors, the eight .1mf capacitors and the two 330 pf capacitors.

- (a) The I.C.s have one end identified by a notch, and/or a spot or dimple next to pin 1. See fig. 1. The bill of materials lists the integrated circuits

by their generic number, such as 74S22 or 74LS08. There will usually be a two-letter prefix before the generic number. This is different for different manufacturers. The parts will actually be labeled "DM74S22N" or "SN74LS08N," etc. Note there is also a suffix "N" usually added to the generic number.

- (b) The diode has its cathode identified by the band painted on the body. This corresponds to the flat bar of the schematic symbol. (See Fig. 2).
- (c) The electrolytic capacitor C1 will have a + symbol printed on one side.

4. CIRCUIT BOARD ASSEMBLY

The most important part of your work will be the soldering. Take the time to do it right. Most people tend to use too much solder and too little heat. Don't be afraid to leave the soldering iron on the solder joint until the board and the component lead are hot enough to melt the solder. (Two to three seconds.)

Refer to the assembly drawing (Fig. 3) and the silk screen drawing on the board for component location. There is no particular order that the parts have to be assembled. There are a few areas that need special attention. These are listed below:

1. Note that the "+" side of capacitor C1 goes towards the green connector.
2. Diode CR1 must be inserted with the black band towards the bottom edge of the board.
3. The resistors do not take solder as well as the other components. You will need to leave the soldering iron on them a little longer. Check these joints carefully after soldering. Bend the leads on resistors R1 & R2 and install them so that the value can be seen after they are installed. This will help later when you do your inspection.
4. The two brown 330 pf capacitors C10 and C11 must be mounted on the back, or circuit side of the board.
5. The I.C.'s have one end identified by a notch, and/or spot or dimple next to pin "1". (See Fig. 1.) Note that all of the I.C.'s are inserted with pin "1" towards the top left corner of the board or the bottom left corner. The dot on the board indicates pin "1".

The I.C.'s will have their pins spread out slightly and you will need to push them inward slightly by pressing against a flat surface before they will go into the holes. Make sure that each pin has gone into its respective hole and that none are curled up under the I.C. Don't solder any of the I.C.'s until after you have inserted all of them and checked them against the assembly drawing to make sure they are all in the proper location. The 8 RAM I.C.'s go in the area marked "RAM ARRAY". Solder the I.C.'s and then check around each solder joint to make sure that you didn't create any solder shorts.

6. Assemble and solder all of the other components before you put the voltage regulator on the board. Note that this part DOES NOT mount on the component side of the board with the other components. It mounts on the back, or circuit side. (Refer to Fig. 4.) Be sure to mount it with the printing towards the board. Don't forget to install the aluminum heat sink as shown.

After all the other parts have been assembled and soldered, add the connector. (See Fig. 4). Insert it on the component side. Make sure the white key in pin "3" is to the left. It doesn't go all the way against the board. Before it can be aligned, the case must be partially assembled. Put the four 3/4" screws thru the case & hex spacer. Secure hd with four white nylon nuts. Now adjust the connector so that the back of it is flush with the inside edge of the metal case.

Solder a corner pin on each end and then check the alignment. If everything looks okay, take the board out of the case and solder the other pins. Be sure to use enough heat. **DO NOT CUT THE PINS OF THE CONNECTOR OFF.** They are soldered to the small board for expansion port.

Now that the board is completed, clean the flux off of the board with a spray can of "Rosin Flux Remover" available from Radio Shack.

7. Give the board a thorough visual inspection. Check all solder joints and check very carefully for solder shorts.
8. The small board that is used for the expansion port does not have to be put on until you need it. Test the board first. When you are ready to put this board on, bend the bottom row of connector pins up slightly and bend the top row down slightly. Insert the small board so that the cut-out is on the same side as the voltage regulator (VR1). (It should be opposite the white key in the connector.) Solder the pins to the fingers on the board.
9. Put the board back in the case. The screws and green connector come out the front. The short screws hold the back of the case on. Then put the Byte-Back label on the front of the case. (This label is necessary because someone may see your M-64 and want to know where s/he can get one.)
10. Now your M-64 is ready to test. Refer to the "BASIC OPERATION" section on the first page. If you have any problems, refer to the next section.

FAULT FINDING

The majority of the faults with the kits are due to bad soldering. Most people tend to use too much solder and not enough heat. If your M-64 doesn't work, check again for solder shorts and bad solder joints. Also, clean the edge connector on your ZX80/1 with a pencil eraser. If the ZX80/1 doesn't work when the M-64 is connected, check for solder shorts around the connector or the other end of the traces going to the connector. Be sure to wait approximately five seconds for the cursor to appear on the screen.

If you want to repair your M-64 module yourself, send us your defective component and we will ship you a replacement the next day. Trying to repair your M-64 yourself will NOT void your warranty.

SERVICE & WARRANTY

All BYTE-BACK modules carry a 90-day warranty. This includes kits. We will repair your M-64 free during this period if you have any trouble with it. Naturally, in the case of kits, the warranty doesn't cover kits that have been assembled wrong. If your kit doesn't work, return it with \$10 plus \$3 shipping (\$13 total) and we will repair it. If the problem is found to be defective parts supplied by us, we will refund the full service fee including the shipping charge. Please return units to be repaired:

BYTE-BACK CO.

Rt. 3 Box 147 Brodie Rd.
LEESVILLE, SC 29070

Please include a note with your name, address, phone number and a description of the problem. For questions and assistance you may call us at 803-532-5812. Since you will probably be working on your kit at night, someone will be available in the evenings also. We will be glad to assist you.

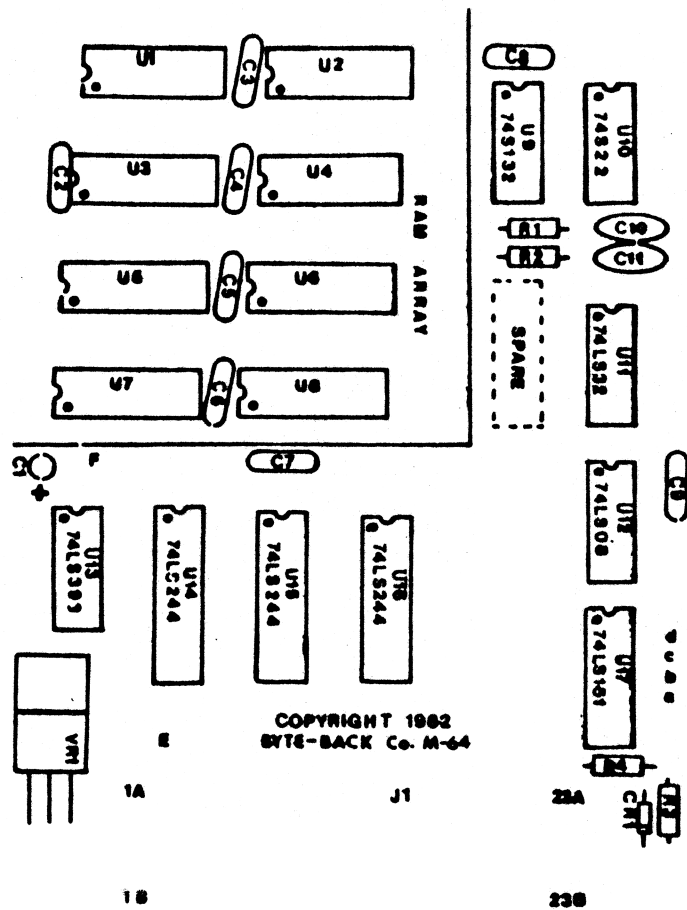


FIG. 3

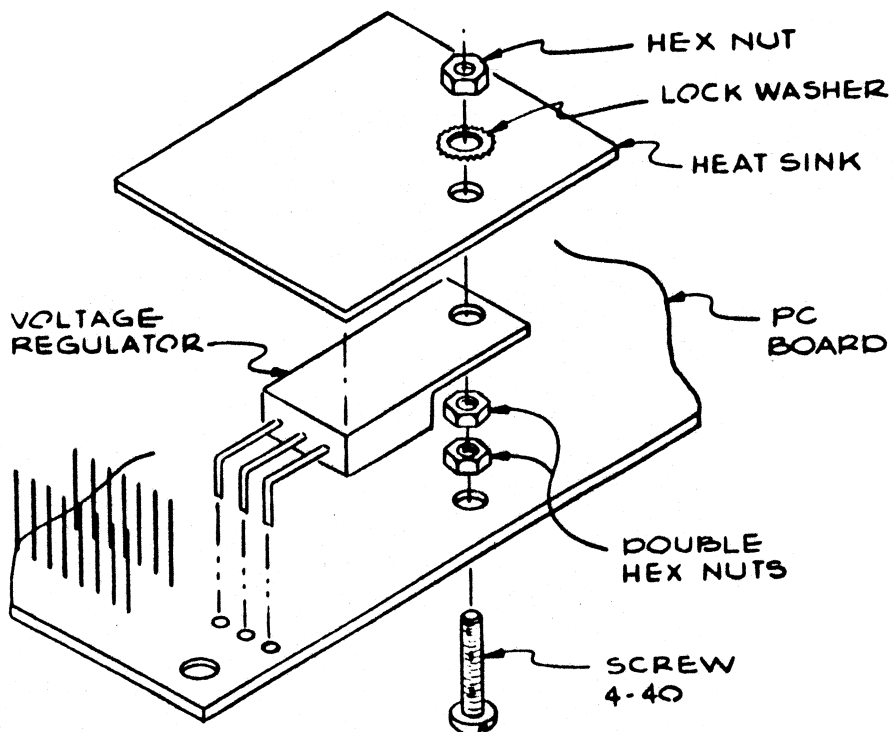


FIG. 4

VOLTAGE REGULATOR MOUNTING DETAIL

BYTE-BACK'S M-64 MEMORY MODULE

BILL OF MATERIALS

ITEM #	QNTY	DESCRIPTION
1.	8	MCM6665, 64K RAM I.C.-U1 thru U8
2.	1	74S22 I.C. U10
3.	1	74LS32 I.C. U11
4.	1	74LS08 I.C.- U12
5.	1	74LS393 I.C.-U13
6.	3	74LS244 I.C.-U14, U15, & U16
7.	1	74LS151 I.C.-U17
8.	1	Voltage regulator, 5v. VR1 (marked LM340-ct or 7805) See Fig 4.
9.	1	1N4148, high speed switching diode, CR1
10.	2	Capacitor, 330 pf 5% (dark maroon color) C10 & C11
11.	1	Capacitor, 3.3 mf tantalum (round part marked 3.3) C1
12.	1	Resistor, 274 ohm 1% 1/4w. (blue or brown, marked 274) R1
13.	1	Resistor, 453 ohm 1% 1/4w. (blue or brown, marked 453) R2
14.	1	Resistor, 1K 1/4w. (brown, black, red) R4
15.	1	Resistor, 330 ohm 1/4w. (orange, orange, brown) R3
16.	1	Connector (green, 2x23 pins to mate with ZX81)
17.	1	Key for connector (white, included in connector)
18.	1	Printed circuit bd. (small with edge fingers)
19.	1	Printed circuit bd. 3 1/2" x 4 3/4" (main bd.)
20.	1	Metal case (2 parts)
21.	1	Screw, 4-40x3/4" zinc plated steel to mount voltage regulator
22.	4	Screw, 4-40x3/4" black
23.	4	Screw, 4-40x1/4" black
24.	4	Hex spacer with 4-40 threads
25.	7	Nut, 4-40
26.	1	label (BYTE-BACK M-64)
27.	1	Manual with instructions and schematic
28.	1	Heat sink, flat aluminum plate
29.	8	Capacitor, .1 mf monolithic (blue with 104 Z5E marking) C2 thru C9
30.	1	74S132
31.	1	LOCKWASHER

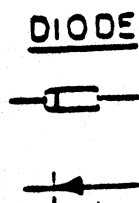
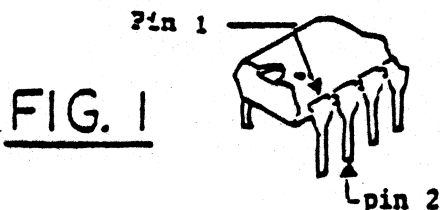


FIG. 2

